

SACCO RIVER BASIN
ROCHESTER, NEW HAMPSHIRE

MILL POND DAM

NH 00387

NHWRB 204.01

PRELIMINARY INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



LOW HAZARD DAM

DECEMBER 1980

Mill Pond Dam

New Hampshire 00387

NHWRB 204.01

Rochester, New Hampshire.

The Mill Pond Dam is located on the Cocheco River, approximately 1,500 feet downstream of the village of Gonic in Rochester, New Hampshire. The dam can be reached from a town road which intersects State Route 125 in Gonic. The dam is shown on the USGS Berwick-ME, NH Quadrangle at approximate coordinates N4316.2, W7058.6 (see location plan on Page B-2). The dam is owned by the Spaulding Fibre Company of Gonic, New Hampshire.

The dam consists of a gravity, overflow type spillway constructed of concrete and founded on bedrock. The spillway is generally in fair condition except for a 6 foot section of the right side that has deteriorated and accumulated low flow debris. There is an abandoned penstock at the left abutment which has been plugged but is leaking at the present time. The dam is approximately 80 feet long and 24.1 feet high with a spillway crest length of approximately 60 feet. The spillway crest elevation is approximately 160 feet (NGVD) with approximately 2.1 feet of freeboard. The right abutment is bedrock and serves as a training wall downstream. The remains of a burned sawmill structure are located at the left abutment. There are no operable outlets at this dam and no means of lowering the reservoir in an emergency. A detailed inspection was not made.

The dam was constructed prior to 1935 to provide power to a sawmill. An inspection was performed in 1935 by the New Hampshire Public Service Commission. The report of that inspection indicated that the penstock at the left abutment was plugged but the power plant was in operation. There is another inlet structure approximately 300 feet upstream of the dam on the left bank of the reservoir. This structure probably is the inlet to the power plant discussed but no information is available to indicate its size, invert or capacity and the corresponding outlet could not be located. The power plant was apparently operational through 1942 but was burned some time prior to July, 1950. The dam has served only recreational purposes since that time.

The Cocheco River watershed is of rolling mountainous terrain, mostly forested but including a sizable portion of pasture and field. In addition, the river flows through the town of Rochester and the village of Gonic, so some of the flow is urban runoff. Some hydrologic storage is found in the meandering nature of the river and in several dams located upstream of the Mill Pond Dam. The Mill Pond Dam impounds a volume of about 25 acre-feet, and the drainage area is about 80 square miles at the dam site.

Water spilling over the top of the spillway falls onto bedrock and continues downstream in a well defined channel with lightly wooded overbanks. No housing or roadway structures are presently located immediately downstream, nor within the flood stages.

A bridge is located on a minor road about 2 miles downstream of the dam. This is a deteriorated timber bridge which is now closed, and it is assumed to be of little importance. The slope of the Cocheco River begins to take a milder gradient and finally meets with the Insinglass River about 3 miles downstream.

Dam Failure Analysis

The peak outflow at Mill Pond Dam that would result from dam failure is estimated using the procedure suggested in the Corps of Engineers, New England Division's April 1978 "Rule of Thumb Guidelines for Estimating Downstream Dam Failure Hydrographs." Failure is assumed to occur at the elevation of the right abutment. This is 24.1 feet above the natural streambed level. Just prior to failure, the normal outflow through the spillway would be 790 cfs. Assuming a 20 foot gap is opened in the dam, the peak failure outflow through this gap and the spillway would be 6,270 cfs.

In the Cocheco River, downstream of the dam, this outflow would result in a depth of flow about 6.1 feet, approximately 4.3 feet above the depth assumed to exist prior to failure. No structures are threatened by flood depths of this magnitude and only an unused bridge exists in the reach from the dam to the confluence with the Insinglass River. The reach is basically a natural section with lightly wooded overbanks. It is expected that the flood wave will be greatly attenuated at the end of the 3 mile reach.

Hazard Classification

The hazard potential of the Mill Pond Dam is considered to fall within the LOW category. Although the flood wave height is approximately 22.5 feet above the channel at failure, loss of human life is not expected and economic loss, if any, would be minimal.

APPENDIX A
PHOTOGRAPHS



1. Spillway From Downstream - Note: Flow Over Bedrock at Right Abutment



2. Spillway During Winter - Note: Exposed Face



3. Downstream End of Abandoned Penstock - Note: Seepage Through Wall

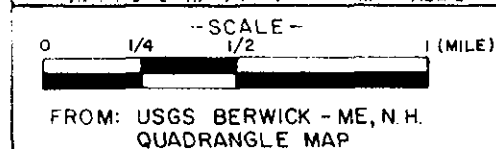


4. Walls of Abandoned Mill at Left Abutment



5. Downstream Channel and Remains of Mill Building

APPENDIX B
ENGINEERING DATA



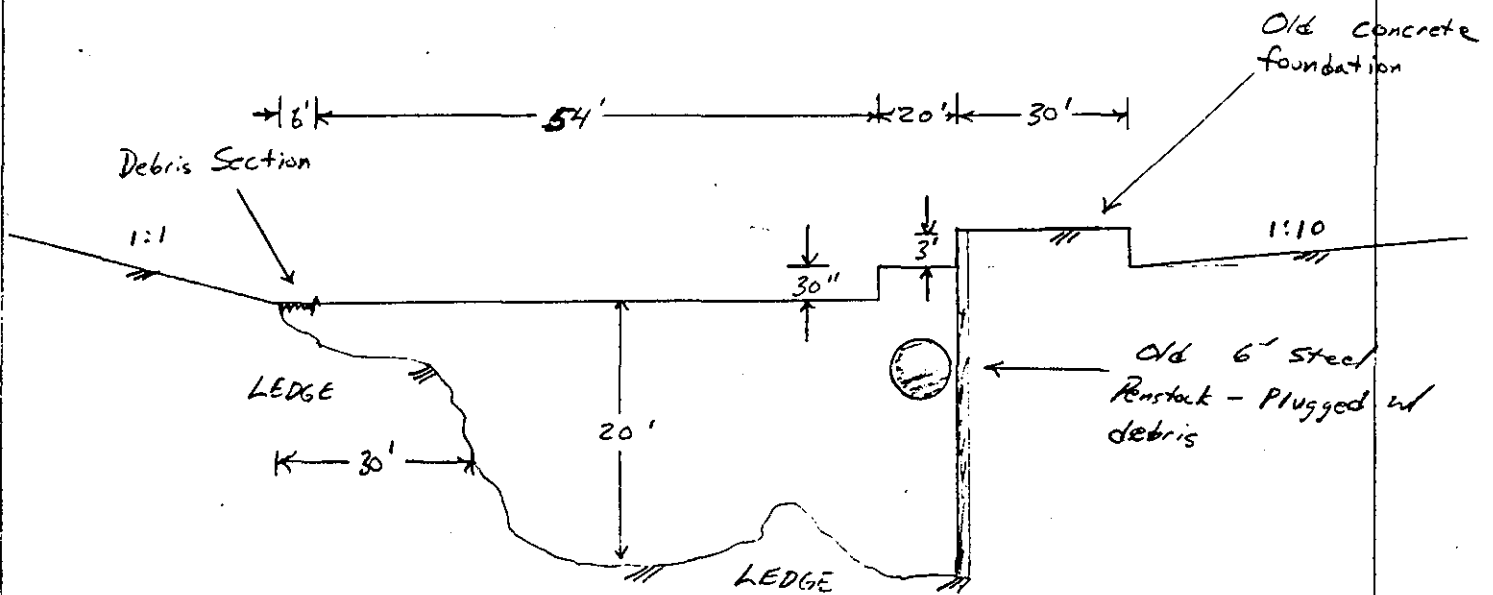
U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DATE	
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Schematic of Mill Pond Dam

(not to scale)



Based on field notes

NEW HAMPSHIRE WATER RESOURCES BOARD
Concord, N. H.

March 19, 1951

Gonic Manufacturing Company
Gonic, New Hampshire

Gentlemen:

The Power Survey Sub-Committee of the New England-New York Inter-Agency Committee has requested the New Hampshire Water Resources Board to furnish certain information with respect to existing industrial hydroelectric plants in New Hampshire.

The New Hampshire Water Resources Board maintains a partial file of this information. However, this file is incomplete and possibly in error due to changes in facilities. We are, therefore, circularizing the parties concerned for their assistance in this matter.

Will you please complete and correct the attached form to the best of your ability and return it in the enclosed envelope.

Very truly yours,

Leonard R. Frost
Leonard R. Frost
Water Resources Engineer

lrf:c

Received 4/1/31
Time 9a
N. H. WATER RESOURCES BOARD

Company Name and Address:

Gonic Manufacturing Co

Gonic New Hampshire

From New Hampshire Water Resources Board Files:

Location or Plant Name	Stream	Drainage Area Sq. Mi.	Gross Head Feet	Installed Capacity K.W.	Average Annual Energy
<u>Gonic</u>	<u>Cocheco River</u>	<u>80.4</u>	<u>32</u>	<u>130</u>	<u></u>
<u>do</u>	<u>do do</u>	<u>80.4</u>	<u>18</u>	<u>130</u>	<u></u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>

Your Corrections :

<u>Gonic</u>	<u>Cocheco River</u>	<u>80.4</u>	<u>None</u>	<u>None</u>	<u>None</u>
<u>"</u>	<u>" "</u>	<u>80.4</u>	<u>None</u>	<u>None</u>	<u>None</u>
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>

Is your figure for Average Annual Energy

☐ Estimated

☐ Based on meter information

By R. V. Jones

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN Rochester DAM NO. 204.01 STREAM Cocheco River

OWNER Gonic Mfg. Co. ADDRESS Gonic, N.H.

In accordance with Section 20 of Chapter 133, Laws of 1937, the above dam was inspected by me on July 27, 1950 accompanied by _____

NOTES ON PHYSICAL CONDITION

Abutments Good

Spillway Good

Gates ?

Other _____

CHANGES SINCE LAST INSPECTION Same, except there is no sawmill now
(buried town)

FUTURE INSPECTIONS

This dam (is) (~~is not~~) a menace because at head of pondage and
property destruction

REMARKS 1" water over spillway.
Rebar not used

Copy to Owner	Date

Frankie Colman
INSPECTOR

(Additional Notes Over)

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN ROCHESTER DAM NO. 204.01 STREAM Cocheco River

OWNER Gonic Mfg. Co. ADDRESS Rochester, N. H.

In accordance with Section 20 of Chapter 133, Laws of 1937, the above dam was inspected by me on July 25, 1940 accompanied by _____

NOTES ON PHYSICAL CONDITION

Abutments Good Condition

Spillway Good Condition

Gates Operable

Other general good condition

CHANGES SINCE LAST INSPECTION _____

FUTURE INSPECTIONS _____

This dam (is) (is not) a menace because location above highway and property

REMARKS _____

Copy to Owner	Date

C. D. Oliver
INSPECTOR

(Additional Notes Over)

NEW HAMPSHIRE WATER RESOURCES BOARD

QUESTIONNAIRE

WATER POWERS OF NEW HAMPSHIRE

Gonic Mfg. Company
Rochester
New Hampshire

Gentlemen:

We maintain in this office a list of the water power installations in New Hampshire. In recent months we have had several inquiries concerning the water power installations in the State and have found that our information is in some cases out of date.

We are, therefore, bringing this information up to date and request your cooperation by filling in the questionnaire below with data on your development, and return it to us in the enclosed stamped envelope.

Very truly yours,

R. S. Holmgren
Richard S. Holmgren
Chief Engineer

RSH:GMB
Encl.

Dam No. 204.01 : Location: Cocheco River at Rochester

1. Will you please check or correct:

	Our Data	Your Corrections
Drainage Area - Sq.Mi.	80.4	
Head - feet	32	
Capacity	500	240
Wheel - H.P.		
Generator - K.W.		180 KW

2. Is the power plant now in operation? Yes
3. If not, is the equipment in operable condition?
4. Is the dam in good repair? Yes

(Signed)

E. G. Plame
Agent

Date 7/23/42

ok

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

LOCATION

STATE NO. 204.01
Town Rochester : County Strafford
Stream Cocheco
Basin-Primary Ocean : Secondary Cocheco
Local Name _____
Coordinates—Lat. 43° 15' + 7350 : Long. 71° 0' - 6200

GENERAL DATA

80.36 WRB 11.7 W.R.B.
Drainage area: Controlled _____ Sq. Mi.: Uncontrolled _____ Sq. Mi.: Total _____ Sq. Mi.
Overall length of dam 80 ft.: Date of Construction _____
Height: Stream bed to highest elev. 25 ft.: Max. Structure 22' 10" ft.
Cost—Dam _____ : Reservoir _____

DESCRIPTION Gravity concrete Foundation ledge ✓

Waste Gates

Type (Old penstock plugged)
Number _____ : Size _____ ft. high x _____ ft. wide
Elevation Invert _____ : Total Area _____ sq. ft.
Hoist _____

Waste Gates Conduit

Number _____ : Materials _____
Size _____ ft.: Length _____ ft.: Area _____ sq. ft.

Embankment

Type _____
Height—Max. _____ ft.: Min. _____ ft.
Top—Width _____ : Elev. _____ ft.
Slopes—Upstream _____ on _____ : Downstream _____ on _____
Length—Right of Spillway _____ : Left of Spillway _____

Spillway

Materials of Construction _____
Length—Total 60' approx. ft.: Net 65' WRB ft.
Height of permanent section—Max. 22' 10" ft.: Min. _____ ft.
Flashboards—Type None ✓ : Height _____ ft.
Elevation—Permanent Crest _____ : Top of Flashboard _____
Flood Capacity 800 cfs.: 10.3 cfs/sq. mi.

Abutments

Materials: _____
Freeboard: Max. 2.2' ft.: Min. _____ ft.

Headworks to Power Devel.—(See "Data on Power Development")

OWNER Gonic Mfg. Co.

REMARKS Condition fair Subject to inspection
Use-power Menance yes

Tabulation By _____ Date _____
B&B21284

**NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON WATER POWER DEVELOPMENTS IN NEW HAMPSHIRE**

LOCATION **AT DAM NO.** 204.01
 Town Rochester : County
 Stream Cocheco
 Basin-Primary Ocean : Secondary Cocheco
 Local Name

GENERAL DATA

Head-Max. ft. : Min. ft. : Ave. 32' ft.
 Date of Construction : Use of Power Industrial
 Pondage ac. ft. : Storage ac. ft.

DESCRIPTION**Racks**

Size of Rack Opening
 Size of Bar : Material
 Area: Gross Sq. Ft. : Net sq. ft.

Head Gates

Type
 Number : Size ft. high x ft. wide
 Elevation of Invert : Total Area sq. ft.
 Hoist

Penstock

Number 1 : Material ? (Old Penstock Plugged)
 Size : Length

Turbines

Number : Makers Hunt twin 36"
 Rating HP. per unit : Total Capacity 500 HP.
 Max. Dement C.F.S., per unit : Total cfs.

Drive

Type

Generator

Number 1
 Make General Elec.
 Rating KW., per unit : Total Capacity 360 K. W.

Exciter

Number : Make
 Rating-per unit : Total Capacity K. W.

OUTPUT—KWHRS

19.....	.....	19.....	.....
19.....	.....	19.....	.....
19.....	.....	19.....	.....
19.....	.....	19.....	.....
19.....	.....	19.....	.....

OWNER Gonic Mfg. Co.

Tabulation By RT Date 1939

NEW HAMPSHIRE WATER RESOURCES BOARD

INVENTORY OF DAMS AND WATER POWER DEVELOPMENTS

DAM

BASIN Ocean NO. 1 - 46 - I-4913
 RIVER Cocheco MILES FROM MOUTH D.A.SQ.MI. 80.36 77.7 ^{WR}
 TOWN Rochester OWNER Gonic Mfg. Co. Gonic
 LOCAL NAME OF DAM _____
 BUILT _____ DESCRIPTION Gravity - Concrete on Ledge

POND AREA-ACRES _____ DRAWDOWN FT. _____ POND CAPACITY-ACRE FT. _____
 HEIGHT-TOP TO BED OF STREAM-FT. 25± MAX. _____ MIN. _____
 OVERALL LENGTH OF DAM-FT. 80± MAX. FLOOD HEIGHT ABOVE CREST-FT. _____
 PERMANENT CREST ELEV. U.S.G.S. _____ LOCAL GAGE _____
 TAILWATER ELEV. U.S.G.S. _____ LOCAL GAGE _____
 SPILLWAY LENGTHS-FT. 60± (65 WRB) FREEBOARD-FT. 2.167 (2.2 WRB)
 FLASHBOARDS-TYPE, HEIGHT ABOVE CREST None
 WASTE GATES-NO. _____ WIDTH MAX. OPENING _____ DEPTH SILL BELOW CREST _____

REMARKS Condition Fair

Assumed C = 3.8

POWER DEVELOPMENT

UNITS	NO.	RATED HP	HEAD FEET	C.F.S. FULL GATE	KW	MAKE
	<u>1</u>	<u>500</u>	<u>32</u>			<u>36" Rodney Hunt</u>
	<u>1</u>				<u>360</u>	<u>General Electric</u>
USE	<u>Power</u>					

REMARKS Meneco Head is from Canal

DATE 11/19/35

CALCULATION SHEET

Date 11-19-35

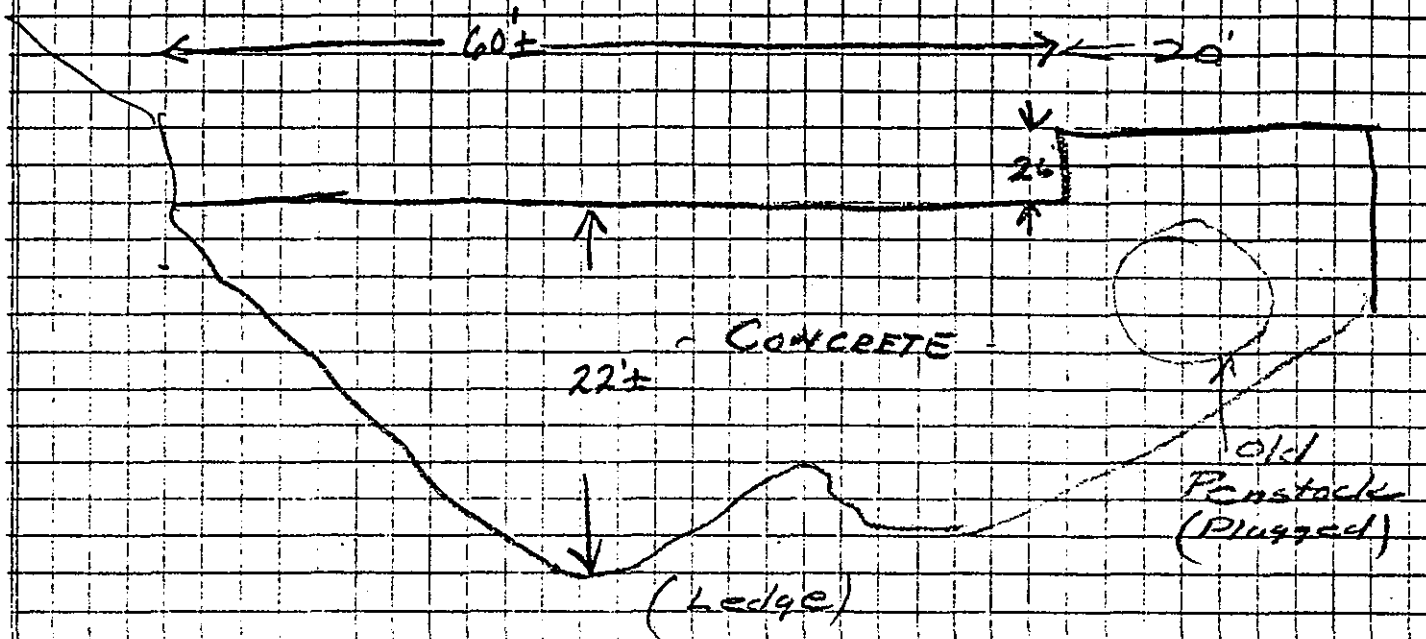
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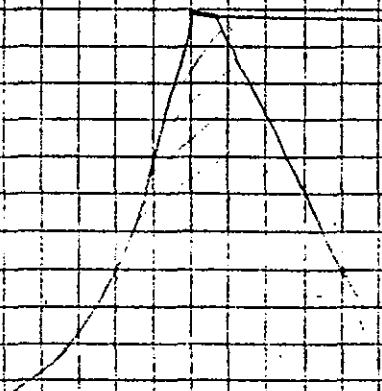
GONIC Mt,
Sawmill Dam

I-4913



32' Head
1 HUNT Turbine 36" 500 HP
GE 360KW

1-Photo



PUBLIC SERVICE COMMISSION OF NEW HAMPSHIRE—DAM RECORD

I-4913

TOWN	Rochester	TOWN NO.	1	STATE NO.	20401
RIVER STREAM	Cocheco River				
DRAINAGE AREA	80.36 Sq. Mi.	POND AREA			
DAM TYPE	Gravity	FOUNDATION NATURE OF	Ledge		
MATERIALS OF CONSTRUCTION	Concrete				
PURPOSE OF DAM	POWER—CONSERVATION—DOMESTIC—RECREATION—TRANSPORTATION—PUBLIC UTILITY				
HEIGHTS, TOP OF DAM TO BED OF STREAM	Approx. 25'	TOP OF DAM TO SPILLWAY CRESTS	2'-2"		
SPILLWAYS, LENGTHS	Approx. 60'			LENGTH OF DAM	Approx. 80'
FLASHBOARDS TYPE, HEIGHT ABOVE CREST	None				
OPERATING HEAD CREST TO N. T. W.	32' from Canal		TOP OF FLASHBOARDS TO N. T. W.		
WHEELS, NUMBER KINDS & H. P.	1-Rodney Hunt-twin-36"-500 HP				
GENERATORS, NUMBER KINDS & K. W.	1-GE 360 KW				
H. P. 90 P. C. TIME 100 P. C. EFF.			H. P. 75 P. C. TIME 100 P. C. EFF.		
REFERENCES, CASES, PLANS, INSPECTIONS.					
REMARKS					

OWNER— Gonic Manufacturing Co.

CONDITION-- Fair

MENACE— Yes. Will be subject to periodic inspection.

To the Public Service Commission:

The foregoing memorandum on the above dam is submitted covering inspection made November 19, 1935, according to notification to owner dated November 16, 1935, and bill for same is enclosed.

Nov. 22, 1935
Copy to Owner

Samuel J. Lord
Hyd. Eng.

C O P Y

November 16, 1935

Gonic Manufacturing Co.
Rochester, N. H.

Dear Sirs:

Pursuant to the duty imposed upon it by Chapter 218 of the Public Laws of New Hampshire, the Public Service Commission will inspect the dams in the vicinity of Rochester on November 19, 1935.

Our Records indicate that you are the owner of three dams in the Town of Rochester, which will be inspected on the above mentioned date. We should be pleased to have you or your representative present during this inspection.

Under the statute all dams in your vicinity will be inspected to determine whether or not they would be a menace to the public safety if improperly maintained. Dams which would not be a menace to the public safety will not be subject to a later periodic inspection. It is our intention to inspect dams which would be a menace to the public safety if improperly maintained about once every five years.

There will be a nominal charge for each dam inspected, which we will endeavor to keep as reasonable as possible consistent with a competent inspection. Our inspector is an expert on dam construction and maintenance, and since you will be charged for his inspection we hope you will be able to be present when he views your dam so that you may avail yourself of his services.

Very truly yours,

N. H. PUBLIC SERVICE COMMISSION

SJL:a

Samuel J. Lord
Hyd. Eng.

APPENDIX C
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DAM FAILURE ANALYSIS

See schematic of dam on next page

Outflow at Failure = Normal outflow at failure elevation
+ Outflow through Breach

Assume that the dam fails at the level of the right abutment, which is

2.5' above the main spillway crest and
22.5' above the channel bottom.

Also assume that the leak through the plugged penstock would contribute only a negligible amount of flow during flood stages.

Using the weir equation:

Main Spillway

$$Q = C L H^{1.5}$$

$C = 3.3 \quad L = 60' \quad H = 2.5$

$$Q = 3.3 \times 60 \times 2.5^{1.5} = \underline{\underline{780 \text{ cfs}}}$$

Left oxbank

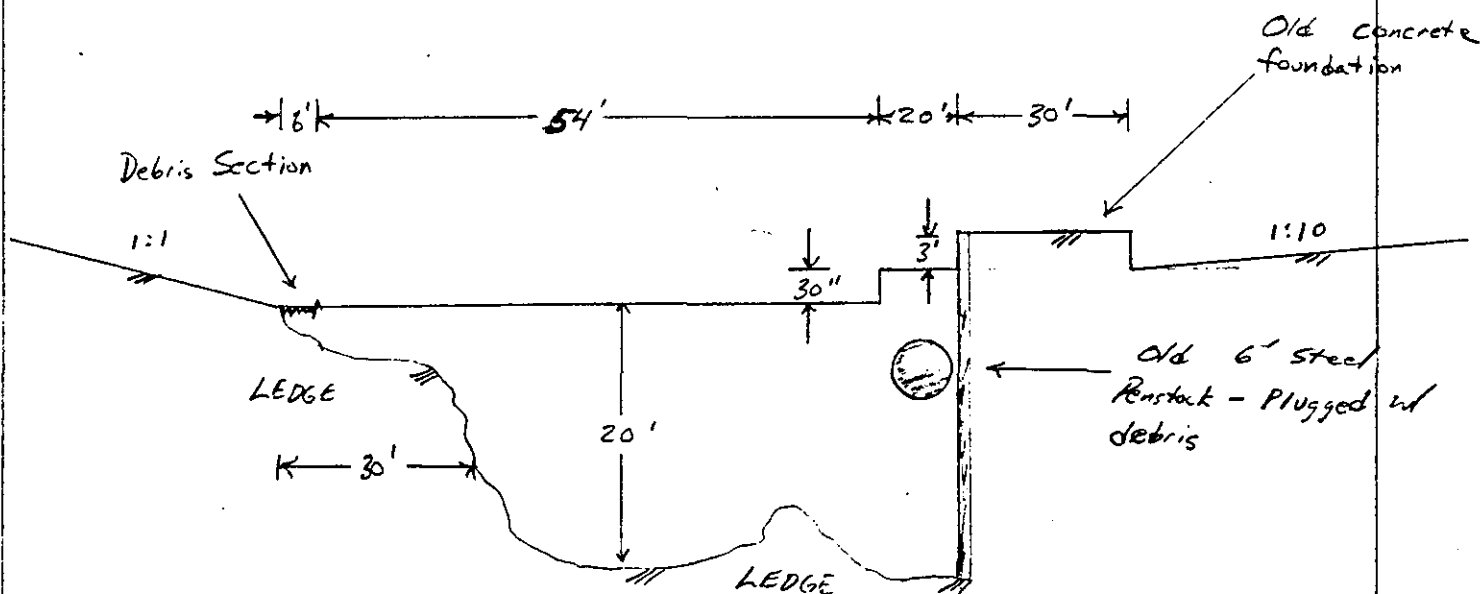
$$C = 2.8$$

$$Q = (2.8) (2.5) (0.5 (2.5))^{1.5}$$

$$Q = 10 \text{ cfs}$$

$$\text{Normal Outflow at Failure} = 780 + 10 = \underline{\underline{790 \text{ cfs}}}$$

Schematic of Mill Pond Dam
(not to scale)



Based on field notes

Breach Outflow

$$Q_{PI} = \frac{8}{27} * W_b * \sqrt{g} * y_0^{3/2}$$

W_b = width of breach

$$W_b \approx 0.4 * (\text{width of dam at } 1/2 \text{ height})$$

$$\text{USC } W_b = 0.4 * (80 - 30) = 20'$$

$$y_0 = 22.5'$$

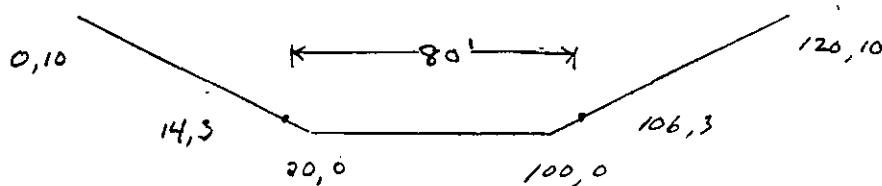
$$Q_{PI} = \frac{8}{27} * 20' * \sqrt{32.2} * (22.5')^{1.5}$$

$$Q_{PI} = \underline{3590} \text{ cfs}$$

The Breach Outflow contains a certain percentage of the Normal Outflow at Failure, because failure occurs along the principle spillway. This percentage is a ratio of the breach width and spillway length, or $20/60 = .33$ or 33% Accounted For.

$$\begin{aligned} \underline{\text{Total Outflow}} &= \text{Breach} + (1.00 - .33) * (\text{Normal Outflow}) \\ &= 5740 + (.67) * (790) = \underline{6270} \text{ cfs} \end{aligned}$$

Sketched below is a typical downstream cross section. The rating table for this section is found on the next page.



Overbank $n = .07$

Slope = .007

Channel $n = .035$

===== DATA FOR THE COMBINED SYSTEM =====

DEPTH ft.	ELEV ft.	AREA ft ²	WPER ft.	HYD-R ft.	AR2/3	Q cfs
0.00	0.0	0.0	0.0	0.0	0.0	0.0
0.50	0.5	40.5	82.2	0.5	25.3	90.0
1.00	1.0	82.0	84.5	1.0	80.4	286.3
1.50	1.5	124.5	86.7	1.4	158.5	564.4
2.00	2.0	168.0	88.9	1.9	256.7	914.4
2.50	2.5	212.5	91.2	2.3	373.5	1330.5
3.00	3.0	258.0	93.4	2.8	507.9	1809.0
3.50	3.5	304.5	95.7	3.2	658.9	2378.2
4.00	4.0	352.0	97.9	3.6	826.2	3009.4
4.50	4.5	400.5	100.1	4.0	1009.2	3700.7
5.00	5.0	450.0	102.4	4.4	1207.6	4450.5
5.50	5.5	500.5	104.6	4.8	1421.2	5257.3
6.00	6.0	552.0	106.8	5.2	1649.8	6120.1
6.50	6.5	604.5	109.1	5.5	1893.2	7037.8
7.00	7.0	658.0	111.3	5.9	2151.3	8009.7
7.50	7.5	712.5	113.5	6.3	2424.1	9034.9
8.00	8.0	768.0	115.8	6.6	2711.4	10112.9
8.50	8.5	824.5	118.0	7.0	3013.2	11243.2
9.00	9.0	882.0	120.2	7.3	3329.6	12425.1
9.50	9.5	940.5	122.5	7.7	3660.5	13658.3
10.00	10.0	1000.0	124.7	8.0	4006.0	14942.5

From the stream rating table, a Normal Outflow at Failure of 790 cfs would create a stage of 1.8' feet above the channel bottom. At failure, a flow of 6270 cfs would cause a 6.2' stage.

Downstream Flooding

Mill Pond Dam is located in a very sparsely populated area, and hence no housing or industry is threatened by flooding downstream. The first bridge crossing is located approximately 2 miles downstream on a minor road. This bridge, however, is no longer used. About 1 mile downstream of this bridge is the confluence of the Isinglass and Coheco rivers. It is expected that the attenuating effect of the 3 mile reach and the addition of the Isinglass base flow will significantly reduce the failure flow stage and will not be a hazard further downstream.

Hazard Classification

Failure of the Mill Pond Dam would result in only a small increase in the river stage downstream. Since no structures are threatened by damage and no loss of life is expected, a Low hazard classification is appropriate.

Test Flood Analysis

Because the Mill Pond Dam is classified as a Low hazard, a Test Flood Analysis, along with stage-discharge and stage-storage calculations at the dam, has not been performed.

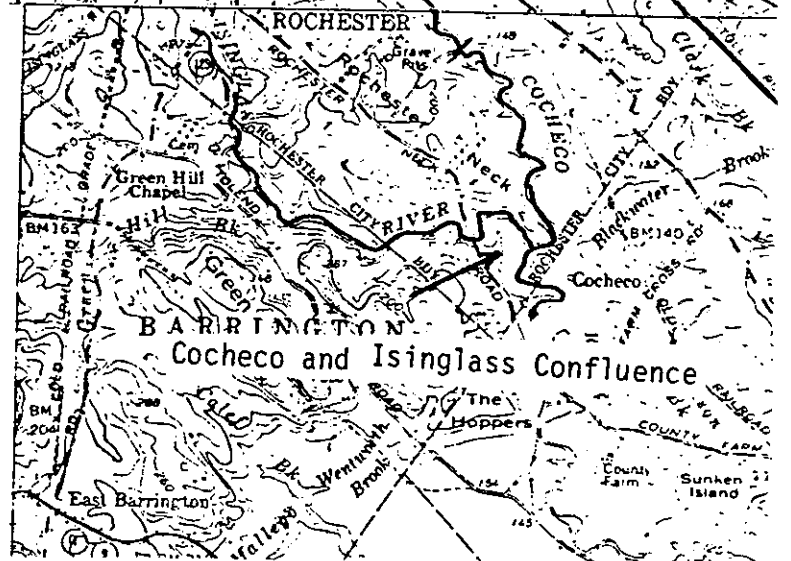


Location and Downstream Hazard Map

Mill Pond Dam

Gonic, New Hampshire

Scale 1:62500





387



387



387

#387

NEDED-E

27 July 1981

Spaulding Fibre Company
Gonic
New Hampshire

Gentlemen:

Inclosed for your use is a copy of the Report on Mill Pond Dam (NH-00387). During the field inspection and the early stages of the preparation of this report, our contractor found that this dam had a "low potential hazard" for downstream damage in the event of a failure. Based on this finding, we directed our contractor to terminate his work and summarize the work accomplished to date. The report inclosed is a copy of this summary.

If you have any questions concerning this report, we suggest you contact the New Hampshire Water Resources Board first; then if there are further questions contact Mr. Gould, Project Management Branch, Engineering Division of this office at (617) 894-2400, extension 313.

Sincerely,

Incl
as stated

JOE B. FRYAR
Chief, Engineering Division

CF: Mr. Gould ✓
Eng Div Files

NEDED-E

27 July 1981

Mr. George M. McGee, Sr.
Chairman, New Hampshire Water Resources Board
State of New Hampshire
Concord, New Hampshire 03301

Dear Mr. McGee:

Inclosed for your use is a copy of the Report on Mill Pond Dam (NH-00387). During the field inspection and the early stages of the preparation of this report, our contractor found that this dam had a "low potential hazard" for downstream damage in the event of a failure. Based on this finding, we directed our contractor to terminate his work and summarize the work accomplished to date. The report inclosed is a copy of this summary.

Sincerely,

Incl
as stated

JOE B. FRYAR
Chief, Engineering Division

CF: Mr. Gould ✓
Eng Div Files